UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

Mr. Larry Lawson, Director
Division of Water Program Coordination
Virginia Department of Environmental Quality
629 Main Street
Richmond, VA 23219

Dear Mr. Lawson:

The United States Environmental Protection Agency (EPA) Region III is pleased to approve the Total Maximum Daily Loads (TMDLs) for the aquatic life (benthic) and primary contact use impairments on Flat Creek. The TMDLs were submitted to EPA for review in April 2004. The TMDLs were established and submitted in accordance with Section 303(d)(1)(c) and (2) of the Clean Water Act to address an impairment of water quality as identified in Virginia's 1998 Section 303(d) list.

In accordance with Federal regulations at 40 CFR §130.7, a TMDL must comply with the following requirements: (1) designed to attain and maintain the applicable water quality standards, (2) include a total allowable loading and as appropriate, wasteload allocations (WLAs) for point sources and load allocations for nonpoint sources, (3) consider the impacts of background pollutant contributions, (4) take critical stream conditions into account (the conditions when water quality is most likely to be violated), (5) consider seasonal variations, (6) include a margin of safety (which accounts for uncertainties in the relationship between pollutant loads and instream water quality), (7) consider reasonable assurance that the TMDL can be met, and (8) be subject to public participation. The enclosure to this letter describes how the TMDLs for the aquatic life and primary contact use impairments satisfy each of these requirements.

Following the approval of these TMDLs, Virginia shall incorporate the TMDLs into an appropriate Water Quality Management Plan pursuant to 40 CFR § 130.7(d)(2). As you know, all new or revised National Pollutant Discharge Elimination System permits must be consistent with the TMDL WLA pursuant to 40 CFR §122.44 (d)(1)(vii)(B). Please submit all such permits to EPA for review as per EPA's letter dated October 1, 1998.

If you have any questions or comments concerning this letter, please don't hesitate to contact Mr. Peter Gold at (215) 814-5236.

Sincerely,

Jon M. Capacasa, Director
Water Protection Division

Enclosure

Decision Rationale

Total Maximum Daily Load for
the Primary Contact and Aquatic Life Use Impairments on Flat Creek

I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those water bodies identified as impaired by a state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety (MOS), that may be discharged to a water quality-limited water body.

This document will set forth the Environmental Protection Agency's (EPA's) rationale for approving the TMDLs for the primary contact (bacteriological) and aquatic life use impairments on Flat Creek. EPA's rationale is based on the determination that the TMDLs meet the following eight regulatory conditions pursuant to 40 CFR §130.

1) The TMDLs are designed to implement applicable water quality standards.
2) The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.
3) The TMDLs consider the impacts of background pollutant contributions.
4) The TMDLs consider critical environmental conditions.
5) The TMDLs consider seasonal environmental variations.
6) The TMDLs include a margin of safety.
7) There is reasonable assurance that the TMDLs can be met.
8) The TMDLs have been subject to public participation.

II. Background

The Flat Creek Watershed is located in Mecklenburg County, Virginia. The watershed is 19,400 acres in size. The 10 mile impairment runs from the discharge of the South Hill Waste Water Treatment Plant (WWTP) to Flat Creek's confluence with the Roanoke River. The Flat Creek Watershed is rural, with approximately 91 percent of the watershed composed of forested (60 percent) and agricultural (31 percent) lands. The remainder of the watershed is composed of residential developments, transitional lands, and wetlands.

In response to Section 303(d) of the CWA, the Virginia Department of Environmental Quality (VADEQ) listed approximately 10 miles of Flat Creek (VAC-L79R) on Virginia's 1998 Section 303(d) list as being unable to attain its primary contact use due to violations of the bacteriological criteria. The stream was also listed for failing to attain its aquatic life use based

on assessments of the biological community. This decision rationale will address the TMDLs for

the primary contact and aquatic life use impairments on Flat Creek.

Flat Creek was listed for violations of Virginia's fecal coliform water quality criteria. Fecal coliform is a bacterium which can be found within the intestinal tract of all warm blooded animals. Fecal coliform in itself is not a pathogenic organism. Its presence indicates the potential for the existence of other pathogenic bacteria. The higher concentrations of fecal coliform indicate the elevated likelihood of increased pathogenic organisms.

EPA has been encouraging the states to use e-coli and enterococci as the indicator species instead of fecal coliform. A better correlation has been drawn between the concentrations of e-coli and enterococci, and the incidence of gastrointestinal illness. The Commonwealth adopted e-coli and enterococci criteria in 2002. Streams are evaluated via the e-coli and enterococci criteria after twelve samples have been collected using these indicator species. Twelve e-coli samples have been collected from Flat Creek and compliance with the primary contact use is now based upon the e-coli criteria.

As Virginia designates all of its waters for primary contact, all waters must meet the current bacteriological criteria to support this use. Virginia's standard applies to all streams designated for primary contact for all flows. The new e-coli criteria requires a geometric mean concentration of 126 colony forming units (cfu)/100ml of water with no sample exceeding 235 cfu/100ml of water. Unlike the fecal coliform criteria, which now allows for a 10 percent violation rate, the new e-coli criteria requires the concentration of e-coli to not exceed 235 cfu/100ml of water. Although, the TMDL and criteria require that the standard not be exceeded, waters are not placed on the Section 303(d) list if their violation rate does not exceed 10 percent.

The TMDL submitted by Virginia is designed to determine the acceptable load of e-coli which can be delivered to the impaired water, as demonstrated by the load-duration approach. The load-duration approach is considered an appropriate method for this analysis. The load duration approach analyzes the impaired segment through the analysis and comparison of observed flows, in-stream bacteria concentrations, and the numeric water quality criteria.

The load-duration approach analyzes the stream's entire flow record to find a correlation between flow regimes and bacteriological concentrations. The load-duration approach uses flow data collected by a local gauging station, in this instance the United States Geological Survey (USGS) gauge 02079640 was used for the TMDL development process. This gauge is located on Allen Creek. Twelve grab flow samples were collected from Flat Creek. A regression analysis was drawn between the observed flow data at the USGS gauge on Allen Creek and grab flow samples taken from Flat Creek. The regression analysis indicated an adequate correlation with an R value of 0.77. The watersheds also had similar drainage areas, flow magnitudes and ecoregions.

The flow data from Flat Creek was entered into an Excel spreadsheet along with daily

mean flow data from several continuous record gauging stations.[1] Using Excel data analysis tools the impaired watershed's flow was correlated to the observed data from Allen Creek. The flow data from the impaired water was plotted against the daily mean flow data from USGS gauge 02079640. Excel plotted a best fit line through the data and developed a regression equation for the relationship. Once the regression equation was developed, a flow for Flat Creek could be ascertained for any flow observed at gauge 02079640 by simply placing that flow through the equation. The flow duration curve for Flat Creek was very flat with all flows being between 1.0 and 3.0 cubic feet per second (cfs).

The next step of the bacteria TMDL was to determine what organisms or sources were responsible for the pollutant loading to the stream. Since fecal coliform is associated with warm blooded animals, as mentioned above, it was necessary to determine which animals were providing the bacteria loadings to Flat Creek. Through a process known as bacterial source tracking (BST), VADEQ was able to break down the sources of bacteria into four categories. The four categories were human, pets, livestock, and wildlife. Three of these four sources are anthropogenic in origin and can be controlled through a variety of management techniques. Wildlife, which may be attracted to certain areas due to anthropogenic reasons, is considered a natural source of bacteria.

The BST approach used by VADEQ is known as the Antibiotic Resistance Approach (ARA), it measures the bacteria's resistance to a suite of antibiotics. The assumption is that different sources of bacteria will have different resistance patterns to antibiotics. In order to conduct this work, waste samples from known sources had to have their resistance measured. This information was then placed into a library. To determine the sources of the bacteria collected in water samples from Flat Creek, the resistance patterns of these unknown sources were compared to the results established in the library. For additional information of the ARA, please refer to Appendix B of the bacteria TMDL.

The BST data collected from Flat Creek was used to determine the percent loading from each of the four source categories. VADEQ collected one year of BST samples from the water. For each sample, VADEQ determined the bacterial concentration and the percent loading derived from each source. The percent loading for each source category was averaged over the annual period. The average annual percent loading was used to determine the loading for each source.

In Flat Creek, the highest bacteria violation occurred during a flow of approximately two cfs, 52 percent of Flat Creek's flows are expected to exceed this flow. The e-coli load for this flow event was 7.24E+14 cfu/year. This was determined by multiplying the concentration by the total volume by 365 days. The allowable load at this same flow was 3.70E+12 cfu/year. This represents a 99.5 percent reduction in loadings. Next the average annual flow was determined for Flat Creek and the same magnitude violation was applied to this flow. A 99.5 percent load reduction was then applied to the e-coli load associated with this flow event. The BST data

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[1]VADEQ, March 2004, "Bacteria TMDL for Flat Creek, Mecklenburg, Virginia

demonstrated that livestock, pets, humans, and wildlife represented 43, 27, 11, and 17 percent of the load respectively. It was determined that all sources must be reduced. If the averages were weighted based on the bacterial concentration of the samples, livestock would have accounted for nearly 98 percent of the load.

Through the development of this and other similar TMDLs, it was discovered that natural conditions (wildlife contributions to the streams) could cause or contribute to violations of the bacteria criteria. BST sampling data collected on Flat Creek indicated that bacteria from wildlife represents approximately 17 percent of the load. Many of Virginia's TMDLs, including the TMDL for Flat Creek, have called for some reduction in the amount of wildlife contributions to the impacted streams. EPA believes that a significant reduction in wildlife is not practical and will not be necessary due to the implementation plan discussed below. It should be noted that in order for Flat Creek to be in compliance greater than 90 percent of time, a lesser reduction would be required. Also, the magnitude of the bacterial violations on Flat Creek have gone down over the last three years, 2001 through 2004, due to upgrades in the WWTP. The stream violated the bacterial criteria just twice during this time.

A phased implementation plan will be developed for all streams in which the TMDL calls for reductions in wildlife. In Phase 1 of the implementation, the Commonwealth will begin implementing the reductions (other than wildlife) called for in the TMDL. In Phase 2, which can occur concurrently to Phase 1, the Commonwealth will consider addressing its standards to accommodate this natural loading condition. The Commonwealth has indicated that during Phase 2, it may develop a Use Attainability Analysis (UAA) for streams with wildlife reductions which are not used for frequent bathing. Depending upon the result of the UAA, it is possible that these streams could be designated for secondary contact.

After the completion of Phase 1 of the implementation plan, the Commonwealth will monitor the stream to determine if the wildlife reductions are actually necessary, as the violation level associated with the wildlife loading may be smaller than the percent error of the model. In Phase 3, the Commonwealth will investigate the sampling data to determine if further load reductions are needed in order for these waters to attain standards. If the load reductions and/or the new application of standards allow the stream to attain standards, then no additional work is warranted. However, if standards are still not being attained after the implementation of Phases 1 and 2, further work and reductions will be warranted.

To assess the biological integrity of a stream, Virginia uses EPA's Rapid Bioassessment Protocol II (RBPII) to determine status of a stream's benthic macroinvertebrate community.[2] This approach evaluates the benthic macroinvertebrate community between a monitoring site and its reference station. Measurements of the benthic community, called metrics, are used to

[2]Tetra Tech 2002. Total Maximum Daily Load (TMDL) Development for Blacks Run and Cooks Creek. Fairfax, Virginia.

identify differences between monitored and reference stations.[3] The state is currently in the process of changing this methodology to a stream condition index (SCI) approach.

As part of the RBPII approach, reference stations are established on streams which are minimally impacted by humans and have a healthy benthic community. These reference stations represent the desired community for the monitored sites. Monitored sites are evaluated as non-impaired, slightly impaired, moderately impaired, or severely impaired based on a comparison of the biological community of the reference and monitored sites. Streams that are classified as moderately (after a confirmatory assessment) or severely impaired after an RBPII evaluation are classified as impaired and are placed on the Section 303(d) list of impaired waters. Flat Creek was assessed as severely or moderately impaired on most of its assessments.

The RBPII analysis assesses the health of the macroinvertebrate community of a stream. The analysis will inform the biologist if the stream's benthic community is impaired. However, it will not inform the biologist as to what is causing the degradation of the benthic community. Additional analysis is required to determine the pollutants which are causing the impairment. TMDL development requires the identification of impairment causes and the establishment of numeric endpoints that will allow for the attainment of designated uses and water quality criteria.[4] A reference watershed approach was used to determine the numeric endpoints for Flat Creek. Numeric endpoints represent the water quality goals that are to be achieved through the implementation of the TMDL which will allow the impaired water to attain its designated use. A reference watershed approach is based on selecting a non-impaired watershed that shares similar landuse, ecoregion, and geomorphological characteristics with the impaired watershed. The stream conditions and loadings in the reference stream are assumed to be the conditions needed for the impaired stream to attain standards.

Since the state is switching to the SCI for biological assessments, the TMDL modelers evaluated Flat Creek based on the SCI. Unlike the RBPII analysis, the SCI has a scoring system based on a statistical analysis of a large benthic database.[5] Therefore, the SCI does not evaluate the benthic community on a one to one basis but evaluates the monitored community against the condition of several nonimpaired waters at once. The stream was evaluated as being in worse condition using the SCI approach as its reference site for the RBPII was also evaluated as impaired. Therefore, although the most recent RBPII assessments showed an improvement in the stream's condition, the stream is still impaired.

Water quality data collected from Flat Creek were compared to water quality criteria and standard benchmarks. The evaluation analyzed Flat Creek's water temperatures, nutrient loads,

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[3]Ibid 3

[4]Ibid 3

[5]MapTech, 2004, General Standard Total Maximum Daily Load Development for Unnamed Tributary to Deep Creek.

dissolved oxygen concentrations, habitat assessments, pH and sediment loads. The analysis concluded that an excessive sediment load was impairing the benthic community of Flat Creek. This determination was based on the aquatic assemblage observed in Flat Creek and the habitat assessment of Flat Creek.

The benthic TMDL was developed using the Generalized Watershed Loading Function model (GWLF). The GWLF model provides the ability to simulate runoff, sediment, and nutrient loadings from watersheds given variable source areas (e.g., agricultural, forested, and developed land).[6] GWLF is a continuous simulation model that uses daily time steps for weather data and water balance calculations.[7] Calculations are made for sediment based on daily water balance totals that are summed to give monthly values. To equate the reference watershed with the monitored watershed, the reference watershed was increased in size to that of the impaired watershed in the model, the landuses were proportionally increased based on the percent landuse distribution. Therefore, the landuse breakdown in the reference watershed remained constant.

A paired watershed approach was used to model the hydrology for Flat Creek and Twittys Creek, the biological reference stream. The hydrology component of the model was developed to a USGS gauge in North Meherrin River. Once the flow records were established for each stream the model was developed to determine their annual sediment loads. The sediment load from the Flat Creek Watershed was reduced to match the sediment load from the Area-Adjusted Twittys Creek Watershed. The loadings in the bacterial model were adjusted until both the instantaneous and geometric mean criteria were attained. Table 1 outlines the loadings for the TMDLs.

Table 1 - Summarizes the Specific Elements of the TMDL.

Segment	Parameter	TMDL	WLA	LA	MOS
Flat Creek	Sediment (tons/yr)	870.5	76.2	707.2	87.1
Flat Creek	E-Coli (cfu/year)	3.66E+12	3.48E+12	1.8E+11	Implicit

The United States Fish and Wildlife Service has been provided with a copy of this TMDL.

III. Discussion of Regulatory Conditions

EPA finds that Virginia has provided sufficient information to meet all of the eight basic requirements for establishing a primary contact (bacteriological) and aquatic life use impairment TMDLs for Flat Creek. EPA is therefore approving this TMDLs. EPA's approval is outlined according to the regulatory requirements listed below.

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[6]Ibid 3

[7]Ibid 3

1) The TMDLs are designed to meet the applicable water quality standards.

Virginia has indicated that excessive levels of bacteria from both anthropogenic and natural sources have caused violations of the water quality criteria and designated uses in the Flat Creek Watershed. The water quality criterion for fecal coliform was a geometric mean 200 cfu/100ml or an instantaneous standard of no more than 1,000 cfu/100ml. Two or more samples over a thirty-day period are required for the geometric mean standard. The Commonwealth has changed its bacteriological criteria as indicated above. The new e-coli criteria require a geometric mean of 126 cfu/100ml of water with no sample exceeding 235 cfu/100ml.

The load-duration approach, described above, was used by the Commonwealth for the development of the Flat Creek TMDL. This approach uses the flow data from a USGS gauge, in-stream water quality data, a regression equation, and BST data to quantify the bacteria loading and the sources responsible for that loading. The load-duration approach in this instance developed a flow record for Flat Creek based on observed flow data of Allen Creek. For each flow along the load-duration curve, the allowable load can be determined by multiplying the instantaneous criteria by the flow. The observed loads were determined by multiplying the observed concentrations by the flow that was observed at that time. In order to insure that the TMDL was protective of all flow conditions, it was developed for the flow that exhibited the greatest difference between the observed and allowable loadings. This reduction was then applied to the average annual load which was determined by multiplying the average annual flow by the bacterial concentration observed at the largest violation. Although, the model was not developed to meet the geometric mean criteria, this criteria should be attained as well since the model was developed to the largest violation.

Through the use of BST, VADEQ was able to break down the sources of bacteria into four categories. The four source categories were human, pets, livestock, and wildlife. Three of these four sources are anthropogenic in origin and can be controlled through a variety of techniques. Wildlife, which may be attracted to certain areas due to anthropogenic reasons, is considered a natural source of bacteria.

VADEQ collected one year of BST samples from the water. VADEQ determined the bacterial concentration and the percent loading derived from each source for each sample. The percent loading for each source category was averaged over the annual period. This average percent loading was used to determine the loading for each source. Reductions were made based on the annual percent loading to insure the attainment of the instantaneous criteria for all flows. The source assessment method used by the Commonwealth did not take into account the concentration of bacteria when determining the percent loading. If the percent loading was weighted based on the bacteria concentration in each sample, livestock would have represented almost the entire load. The Commonwealth is evaluating the various options in determining the source load.

The benthic TMDL was developed using the GWLF. Calculations were made for sediment based on daily water balance totals that were summed to give monthly values. To

equate the reference watershed with the monitored watershed, the reference watershed was increased in size to that of the impaired watershed in the model, the landuses were proportionally increased based on the percent land use distribution. Therefore, the landuse breakdown in the reference watershed remained constant.

A paired watershed approach was used to model the hydrology for Flat Creek and Twittys Creek, the biological reference stream. The hydrology component of the model was developed to a USGS gauge in North Meherrin River. Once the flow records were established for each stream the model was developed to determine the annual sediment loads in both watersheds. The sediment load from the Flat Creek Watershed was reduced to match the sediment load from the Area-Adjusted Twittys Creek Watershed. It is believed that reducing the sediment load to the load observed in Twittys Creek will allow Flat Creek to hold a healthy aquatic assemblage. It should be noted that there has been observed improvements in the benthic community of Flat Creek as seen in the most recent RBPII assessments. These improvements coincide with upgrades to the WWTP and sewer system. As noted in the report both the impaired reach and the upstream RBPII reference station were evaluated as impaired when using the SCI approach. This way, the loadings to Twitty's Creek were used instead of the loadings to the upstream reference station.

2) The TMDLs include a total allowable load as well as individual waste load allocations and load allocations.

Total Allowable Loads

Virginia indicates that the total allowable loading is the sum of the loads allocated to land based precipitation driven nonpoint source areas (forest and agricultural land segments) and point sources. Activities that increase the levels of bacteria to the land surface or their availability to runoff are considered flux sources. The actual value for total loading can be found in Table 1 of this document. The total allowable load is calculated on an annual basis.

Waste Load Allocations

There is one point source of bacteria and sediment to Flat Creek. That facility, South Hill WWTP, is regulated by an individual permit and is permitted to discharge two million gallons of effluent per day with a sediment and e-coli concentration of 30 mg/l and 126 cfu/100ml respectively. The waste load allocation (WLA) can be determined by multiplying the permitted flow by the permitted concentrations by 365 after the appropriate unit conversions. The WWTP makes up a major portion of the bacteria TMDL loadings, it was not reduced because its discharge is unable to cause a violation since it is discharging at criteria. It should be noted that in all likelihood the facility is discharging bacteria at concentrations below its permitted concentration. The WLA can be seen in Table 2.

EPA regulations require that an approvable TMDL include individual WLAs for each point source. According to 40 CFR 122.44(d)(1)(vii)(B), "Effluent limits developed to protect a

narrative water quality criterion, a numeric water quality criterion, or both, are consistent with assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA pursuant to 40 CFR 130.7." Furthermore, EPA has authority to object to the issuance of any National Pollutant Discharge Elimination System (NPDES) permit that is inconsistent with the WLAs established for that point source.

Table 2 - WLA for the Flat Creek TMDL

Facility	Permit Number	Pollutant	WLA
South Hill WWTP	VA0069337	Bacteria (cfu/yr)	3.48E+12
		Sediment (Tons/yr)	76.2

Load Allocations

According to Federal regulations at 40 CFR 130.2(g), load allocations (LAs) are best estimates of the loading, which may range from reasonably accurate estimates to gross allotments, depending on the availability of data and appropriate techniques for predicting loading. Wherever possible, natural and nonpoint source loads should be distinguished.

The load-duration approach used BST data to determine the bacterial loadings from each source category. According to the BST data livestock, pets, humans, and wildlife were responsible for 43, 27, 11, and 17 percent of the load respectively. Table 3a documents the bacteria loading by source category. Based on the BST data, the human load to Flat Creek is very low, in most samples bacteria from human origin were not detected. The percent breakdown for each source would have been different if the bacteria concentration of each sample was accounted for in the analysis. For the sediment TMDL, the GWLF model was used to ascertain the sediment loading to the Flat Creek. This model provides the monthly sediment load to the stream through the use of the universal soil loss equation (USLE). The USLE derives the sediment loading by using information on precipitation rates, best management practices, land slope, and vegetative cover. Table 3b documents the sediment LAs for Flat Creek.

Table 3a - Bacterial LAs for Flat Creek

Source Category	Existing Load (cfu/yr)	Proposed Load (cfu/yr)	Percent Reduction
Livestock	3.07E+14	7.67E+10	99
Pets	2.07E+14	5.17E+10	99
Human	7.85E+13	1.96E+10	99
Wildlife	1.21E+14	3.03E+10	99

Table 3b - Sediment LAs for Flat Creek

Source	Existing Load (Tons/yr)	Allocated Load (Tons/yr)	Percent Reduction
Forest	55.7	55.7	0.00
Agriculture	2,437.2	589.2	76
Developed	109.7	26.5	76
Transitional	69.1	16.7	76

3) The TMDLs consider the impacts of background pollution.

The TMDL considers the impact of background pollutants by considering the bacterial loads from natural sources such as wildlife and sediment loads from forests.

4) The TMDLs consider critical environmental conditions.

According to EPA's regulation 40 CFR 130.7 (c)(1), TMDLs are required to take into account critical conditions for stream flow, loading, and water quality parameters. The intent of this requirement is to ensure that the water quality of the impaired creek is protected during times when it is most vulnerable.

Critical conditions are important because they describe the factors that combine to cause a violation of water quality standards and will help in identifying the actions that may have to be undertaken to meet water quality standards[8]. Critical conditions are a combination of environmental factors (e.g., flow, temperature, etc.), which have an acceptably low frequency of occurrence. In specifying critical conditions in the waterbody, an attempt is made to use a reasonable "worst-case" scenario condition. This was addressed in the Flat Creek bacteria TMDL by modeling the reductions to the flow that exhibited the greatest violation of the criteria. This was done for the sediment TMDL by developing the model over a multi year cycle which included wet and dry years.

5) The TMDLs consider seasonal environmental variations.

Seasonal variations involve changes in stream flow and loadings as a result of hydrologic and climatological patterns. The bacteria loadings to Flat Creek were investigated on a monthly basis to determine if seasonality existed between the sources. Based on the BST results, it was determined that there were minimal seasonal impacts to loading and the source loads were averaged on an annual basis. The TMDL was established to the greatest exceedance. Seasonality was evaluated for the sediment TMDL by using a multi year model that assessed the loads on a monthly basis.

6) The TMDLs include a margin of safety.

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[8]EPA memorandum regarding EPA Actions to Support High Quality TMDLs from Robert H. Wayland III, Director, Office of Wetlands, Oceans, and Watersheds to the Regional Management Division Directors, August 9, 1999.

This requirement is intended to add a level of safety to the modeling process to account for any uncertainty. The MOS may be implicit, built into the modeling process by using conservative modeling assumptions, or explicit, taken as a percentage of the WLA, LA, or TMDL. Virginia included an implicit MOS in the bacteria TMDL through the use of conservative modeling assumptions. The Flat Creek bacteria TMDL was modeled to the single-most extreme water quality violation and applied the reductions necessary during that event to all conditions. An explicit MOS was used for the sediment TMDL by allocating 10 percent of the load to the MOS.

7) There is a reasonable assurance that the TMDLs can be met.

EPA requires that there be a reasonable assurance that the TMDL can be implemented. WLAs will be implemented through the NPDES permit process. According to 40 CFR 122.44(d)(1)(vii)(B), the effluent limitations for an NPDES permit must be consistent with the assumptions and requirements of any available WLA for the discharge prepared by the state and approved by EPA. Furthermore, EPA has authority to object to issuance of an NPDES permit that is inconsistent with WLAs established for that point source.

Nonpoint source controls to achieve LAs can be implemented through a number of existing programs such as Section 319 of the CWA, commonly referred to as the Nonpoint Source Program. As stated above, if the last four years of bacteria data were used, the reductions would have been much less as the bacteria concentrations in these samples were much lower.

8) The TMDLs have been subject to public participation.

The TMDLs were subject to the Commonwealth's public participation process. The public meetings and comment periods for these TMDLs were noticed in the Virginia Register. There were two public meetings held in the Town of South Hill for these TMDLs. The first meeting was held on October 20, 2003 and the second was held on March 16, 2004. Twelve people attended the first meeting and 21 people attended the second. Written comments were received and were addressed by the Commonwealth.